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6. It should lend itself readily to floral decoration by variety and purity of color and distinctiveness of form.

7. The features characteristic of its form should combine such simplicity and gracefulness that, when used conventionally in decorative design, the flower may be readily recognized independently of its color.

8. It should be a flower which has never been used by any other people as their emblem, and not resemble such a flower in general form.

9. It should possess, if possible, patriotic associations plainly connecting it with the best for which our country stands among the nations of the world.

While the convention deemed it inexpedient to make any recommendation of a special flower at that time it was evidently the sense of a majority of the delegates present, as shown by an informal vote, that the columbine, or aquilegia (sometimes known as wild honeysuckle) is the only flower which meets the requirements set forth in the above resolution.

Beside the columbine's qualifications advanced by Mr. Hansen, the following are noteworthy. Short-spurred forms of the flower, native to our Rocky Mountains and to the home of Columbus, resemble so closely a group of doves that the flower's name—like that of the great discoverer, and our national title Columbia—is derived from the Latin *columba*, a dove. Thus, the same flower which rides our mountain storms like an American eagle becomes in quiet valleys a dove-flower symbolizing peace. One of its short-spurred nectaries bears remarkable resemblance to a liberty-cap; those of moderate length are miniature horns of plenty; and the longest are golden trumpets proclaiming Columbia's ideal of liberty, whence comes the peace that makes for plenty, the plenty that makes for power, and the power that makes for peace. A columbine leaf with its many leaflets in organic union, the leader among them having thirteen lobes, aptly recalls that mutual loyalty which the founders of our thirteen original states implied in their motto *e pluribus unum*.

FREDERICK LEROY SARGENT

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THE article on the above subject in the April 12 number of SCIENCE is timely, inasmuch as, if we do not hurry, all the best flowers will be selected ahead of the nation. Even the one Mr. Albert A. Hansen proposes has already been preempted by Colorado.

The *Aquilegia canadensis* is a charming spring flower, well worthy the compliment he pays it, but I will mention a few objections. In the first place, it would be a trespass upon that state's rights to select their flower, especially when there are so many others to choose from. Then its name, *canadensis*, indicates that it was first made known from Canada, which is no part of America, as we wish it to be known, the U. S. A. The chief objection to the wild columbine is that it falls to pieces so readily. This prevents it from being a valuable addition to a bouquet, or for decoration. After the petals have fallen, only the ragged follicles remain. Nor is it extremely common in this part of the country, the specimens I have growing in my garden coming from a start procured with some difficulty.

Some years ago, the goldenrod was proposed for the national flower of America and I have often wished that it might be adopted. There are 47 distinct species of this plant mentioned in Britton and Brown's "Flora," almost as many as the states in the Union. Perhaps one or two more may be discovered to make the number exact. All are of the same color, yellow, like sunshine, symbolic of cheerfulness. The goldenrod belongs to the Composites, the "many in one" family of flowers; and its botanical name, *Solidago*, means to make whole. It is a universal plant in this country, and one species, *Solidago juncea*, blooms from June into November. This is a handsome variety and bears cultivation, as do most of them.

Columbia's flower, the goldenrod, on hill and valley grows;

The gold is for the one who earns, the rod is for her foes.

KATHARINE DOORIS SHARP

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SCIENTIFIC BOOKS

Plants, Seeds and Currents in the West Indies and Azores. By H. B. GUPPY. London, 1917.

Although published last year I experienced considerable difficulty in getting a copy of this book, nor have I noticed any reviews of it in American botanical periodicals. Guppy has long been a student of the sea drift, and strand floras as influenced by ocean currents, and in his well-known book "Observations of a Naturalist in the Pacific," published in 1906, he gave an exhaustive study of insular floras and plant dispersal in that region, as well as some interesting but less profitable discussions of the geological eras of the floral history as he conceived them.

The present volume presents the results of similar studies carried out during the period from 1906 to 1914 in the Antillean region and the Azores. It is just the sort of a book that we have been waiting and wishing for, and in addition to the wide general audience it makes an especial appeal to those who are interested in the geological history of the Antillean region and the relations of the floras and faunas of its perimeters. It undoubtedly contributes toward a solution of paleontological problems and enables them to be viewed from the various angles necessary to their ultimate proof or disproof.

One conclusion of especial interest, in view of the manner in which some paleontologists subscribe to isostasy and think therefore that the permanence of ocean basins is proven, may be illustrated by the following quotation from the preface: "The great lesson that I have learned from the numerous difficult distribution-problems presented in the West Indian region is that one can no longer fight shy of accepting in principle the conclusions relating to past changes in the arrangement of land and water in the Caribbean area, which have long been formulated by English and American geologists and zoologists. The witness of the living plant is often quite as insistent as the testimony of the rocks." He might have added that this statement loses no force from a consideration of the fossil plants.

For the plant geographer every chapter is packed with information, and the fact that the geological history of both the land and its floras is not ignored gives an outlook and a

basis for deduction that are altogether admirable. Without attempting an elaborate abstract or analysis of Guppy's results I wish to mention several aspects of the work that are of especial interest to students of earth history.

Chapter II. is a fine summary of personal observations and the scattered and inaccessible records in the older literature going back to the days of Clusius (1605), of West Indian drift on European shores. This is exceedingly interesting, not only as an illustration of the unsuspected variety of plants represented and distances traversed, but also of the relative frequency of such trans-Atlantic journeys. These may be given point by the fact that in the Hebrides, Orkneys, Shetland and Faroe islands as well as in Scandinavia, snuff, tinder and match boxes made from *Entada* seeds derived from the stranded drift from tropical America have always been highly prized by the natives. Mr. Guppy is apparently unaware that similar *Entada* seeds have reached a resting place in some of the Scandinavian peats after a similar voyage in the late Pleistocene. I mention this, not because it is of any especial importance in the present connection, but as a fact of added interest. Many of these stranded ocean waifs, such as the seeds of *Guilandina*, *Erythrina* and *Ipomæa tuberosa*, have a mystical or superstitious value and are often handed down from generation to generation as charms among these out-of-the-way peoples.

Most seeds after such a long voyage have lost their germinative capacity, even were not the European climate prohibitive. Some, however, retain their vitality, and this has been demonstrated experimentally in the case of *Entada*, *Guilandina* and *Mucuna*, and is conceivable in the case of *Sapindus*, *Ipomæa*, *Dioclea* and *Erythrina*, so that in the early Tertiary, when the climate was much more uniform and mild than it is at the present time in the far north, it is conceivable that certain tropical American forms may have reached Europe in this way.

A highly instructive chapter is that devoted to the similarity between the strandflora of

West Africa and tropical America. This has long been known to botanists and often discussed, as, for example, by Schimper and Engler. The latter is inclined to insist that the present distribution demands a land connection, and this hypothesis is heightened by the usual assumption of such a land bridge by paleogeographers based on the distribution of littoral faunas, the absence of marine Tertiary deposits on the facing coasts, the evidence of the foundering of earth blocks in certain areas, and the absence of Mediterranean elements in the early Tertiary marine fauna of Patagonia.

If the community of floras on the two sides of the tropical Atlantic was entirely confined to strand types the conclusion would be inevitable that this was due entirely to the action of ocean currents, but such is not the case, nor are these features confined to the Recent floras, for in the Tertiary floras of our Gulf states a number of genera common to West Africa and tropical America had already made their appearance.

An important conclusion of Guppy's is that the sphere of influence of the ocean current in determining plant distribution between the Oriental and Occidental tropics is limited, and that their action leaves the main facts of general distribution unconfused. In the comparison of the floras of the West African and American tropical littoral the most direct journey, namely from the former to the latter via the Main Equatorial current, requires that a fruit or seed will float unharmed for from two to three months. The results for 53 species are embodied in a table showing that 6 mangrove, 7 estuary and riverside, and 19 beach plants, or 60 per cent., are found in both regions, and of these 88 per cent. show experimentally that they possess the required buoyancy and resistance to enable them to make such a journey.

While the evidence is only negative it may be noted that the oldest known fossil occurrences of the genera *Rhizophora*, *Avicennia*, *Laguncularia*, *Canavalia*, *Dodonaea*, *Chrysobalanus*, *Conocarpus* and *Carapa* are American. Guppy's discussion is eminently open-minded

and shows conclusively that most of the common species have the necessary powers of resistance, while only 24 per cent. of the strand plants confined to the American tropics possess fruits or seeds capable of making the trans-Atlantic trip. I am, however, inclined to dissent from his conclusion, at least as regards its application during the Tertiary, namely, that since the Main Equatorial current offers the easiest avenue of distribution, this distribution has been from east to west. The more general conclusions derived from a study of geological distribution point in many cases to an original distribution from west to east. The fact that genera like *Moschoxylon* (Meliacæ) with about three score existing species in tropical America and West Africa has fossil species in the lower Miocene of Chile and Colombia indicates that other explanations than dispersal by ocean currents are involved, and the distribution of the family Humiriaceæ is another illustration of the same kind. Many such instances are given in a recent discussion of fossil floras.¹

This is not the place, however, to elaborate this thesis since the distribution of the recent floras of the two regions is fairly well known and Guppy's work concerns only the littoral species and in discussing these he is never dogmatic.

The chapter devoted to the current connections in the Southern Hemisphere, based largely on records of bottles and wreckage, is also exceedingly interesting, but the time involved in such journeys between these outlying land masses is too great to be a large factor in the curious similarities of elements in antipodean floras, which are really results of geological history. Moreover there is rather definite evidence of land connection, especially the early Tertiary connection of Graham Land and Patagonia, at which time *Fagus* and *Nothofagus*, as well as other northern derived types appear to have invaded Patagonia and Chile from the Antarctic.

For shorter distances currents may have been important factors, *e. g.*, tropical Australia

¹ U. S. Geol. Survey Professional Paper 91, pp. 72-140, 1916.

and tropical East Africa have reciprocating currents, while the south coast of Australia receives drift from South Africa and southern South America. Similarly southeastern Australian drift would tend to reach the north end of New Zealand. If the data were only sufficient for the construction of accurate paleogeographical maps for those times of land extension during the Tertiary and Quaternary and if the ocean currents could then be plotted upon these, doubtless much light would be shed on many anomalies of distribution.

Work like that of Guppy, interesting and important as it undoubtedly is, can hardly be said to furnish more than analogies and a basis for theory, since the distribution of most of the orders of plants was a much more ancient process, and unless we are prepared to subscribe to similar continental outlines, climates and ocean currents during the Tertiary, all three assumptions which are negated by what we already know of geological history, we have many other factors than are furnished by existing conditions which must be taken into account.

The chapters headed Differentiation and Distribution are eminently sound in principle and should give plant geographers much food for thought. It is a great pity that in this connection the author seems to be unfamiliar with considerable recent American literature on this subject.

A special chapter is devoted to the distribution of *Sphagnum* and *Carex*, and the Azores occupy the three concluding chapters, while an appendix contains over fifty additional pages of valuable matter.

The book is well written and well printed and is a mine of information which is illuminated throughout with ideas, and it should find a place in every well-equipped library.

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SPECIAL ARTICLES

POST-GLACIAL CONTINENTAL UPLIFT

THE rise and fall of great areas of the earth's surface (diastrophism) is one of the most cer-

tain facts of human observation. Isostasy, the general equilibrium or balancing of pressures within the earth's "crust," is recognized as a fundamental principle of geophysics. The crust of the earth is sensitive to unbalanced pressures, the loading and unloading of different areas. It is, therefore, reasonable to suppose that the weighting of large areas of northern lands in Pleistocene time by the accumulation of vast continental glaciers, one or two miles in depth, would produce subsidence; and that the return of the ice caps to the sea would cause uprising of the depressed areas.

Whatever may be the opinion of the student of geophysics regarding the effect of the Pleistocene ice caps on diastrophic land movement, yet the fact is certain that the area covered by the latest North American ice sheet, the Labradorean glacier, stood much beneath its present position, relative to sea level, when the ice sheet melted off; and that a recent slow uplift has brought the land to its present attitude. The proof of this Post-Glacial uplift is the occurrence of many high-level beaches and sandplains facing the open sea, and extending far up the valleys in Canada, New England and New York, with the occurrence of abundant marine fossils hundreds of feet above the ocean. These facts have been recognized for nearly a century, and a great number of observations are on record in Canadian and American geological literature. Yet up to the present time the full vertical amount of submergence, or the subsequent uplift, and the extent or limits of the affected area have not been determined beyond dispute. The total amount of the down-and-up movement has nearly always been underestimated, for the reason that the conspicuous or more evident marine features are of inferior and later levels, while the initial and summit shore features are commonly weak and unobtrusive, or they lie so far inland and are so detached as to be unrecognized, or their origin and relationship misinterpreted; usually being referred to glacial agency. Yet the summit or initial level at any locality is the one critical and essential element in the diastrophic problem.